Results

Microglia Morphometric Analyses:

Here we show data obtained from an average of 300 microglial somas and four microglia reconstructions (all obtained per animal, per condition) that were pseudorandomly selected from cortical layer 4.

Microglial morphological adaptations are one of many ways to make gross changes in microglial phenotype, and thus we attempted to quantify this change. We used Stereo Investigator (MBF Bioscience) to estimate the density of microglia and PNNs in the primary somatosensory cortex.

Estimated Microglia density

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (± SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saline</td>
<td>3.8 (± 0.2)</td>
</tr>
<tr>
<td>Mino</td>
<td>3.9 (± 0.2)</td>
</tr>
<tr>
<td>LPS</td>
<td>4.1 (± 0.2)</td>
</tr>
<tr>
<td>Saline + Trim</td>
<td>4.0 (± 0.2)</td>
</tr>
<tr>
<td>Mino + Trim</td>
<td>4.1 (± 0.2)</td>
</tr>
<tr>
<td>LPS + Trim</td>
<td>4.2 (± 0.2)</td>
</tr>
</tbody>
</table>

Microglia and Perineuronal Net Density

There are no differences in microglial density across treatments.

There are no differences in microglial density across treatments. Microglia somas were smaller, as indicated by a shorter perimeter and shorter maximum diameter relative to all other treatments except saline-treated controls. LPS-treated mice had rounder somas relative to sensory-deprived mice treated with either minocycline or LPS.

Form factor is a measure of contour smoothness. LPS-treated mice had microglial somas with smoother contours than whisker-trimmed, LPS-treated mice.

Microglia Processes

Microglia are immune cells, and as such, they store memories of an organism’s inflammatory history in order to maintain homeostasis. Chronic inflammation in microglia (homeostatic, inflammatory, anti-inflammatory) is the root cause of many neurological diseases.

Microglial process length is shortened substantially by whisker trimming. Irrespective of injection treatment, whisker trimming reduces the number of process nodes and ends. Process nodes and ends are formed by the spontaneous formation of branches, which are predominantly formed by the spontaneous formation of branches.

Mice with intact or trimmed whiskers treated with saline have fewer primary processes relative to all other treatments. Sensory deprivation via whisker-trimming has a robust impact on microglial processes. Irrespective of injection treatment, whisker trimming reduces the number of process nodes and ends. Microglial process length is further substantially by whisker trimming.

Microglial process density alone is greater compared to all other treatments. Sensory deprivation via whisker-trimming has a robust impact on microglial processes. Irrespective of injection treatment, whisker trimming reduces the number of process nodes and ends. Microglial process length is further substantially by whisker trimming.

Microglial process density alone is greater compared to all other treatments. Sensory deprivation via whisker-trimming has a robust impact on microglial processes. Irrespective of injection treatment, whisker trimming reduces the number of process nodes and ends. Microglial process length is further substantially by whisker trimming.

Perineuronal Net Integrity

Compart PNNs have a diffuse, diffuse morphology. Reduced PNN integrity is linked to various activities involved in PNN regeneration.

Microglia and Perineuronal Net during Critical Period Development of the Somatosensory Cortex

Exploring the relationship between microglia and the perineuronal net during critical period development of the somatosensory cortex.

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ABSTRACT

It remains unclear whether microglia shape PNNs in an experience-dependent manner. Though there is circumstantial evidence, to date, no one has shown causal evidence of microglia and PNN interaction. To ascertain whether microglia interact with the PNN, we are altering the physiological state of microglia via pharmacological manipulations and examining the net density in mouse litters with intact whiskers and trimmed whiskers. Pup brains were harvested at P30 and on the vibrissae at a thickness of 40 µm. Tissue sections containing the primary somatosensory cortex (S1) were stained using immunohistochemistry for labeled calcium binding adaptor molecule 1 (IBA-1) to visualize microglia, or using histochemistry for wisteria floribunda lectin (WFA) to visualize PNNs.

Error bars indicate the standard error of the mean (SEM), and asterisk indicates p<0.05